PRELIMINARY DRAFT

MUNICIPAL POINT SOURCE

Yellowstone-Tongue APO
Broadus, Montana

This report was financed by a Section 208 Areawide Waste Treatment Management Planning Grant from the U.S. EPA.

II

MUNICIPAL POINT SOURCES

The regulatory program for municipal point sources has become well established through the National Pollutant Discharge Elimination System (NPDES) and the State of Montana's version, the MPDES, administered by the Water Quality Bureau. Self-monitoring is required of all dischargers with periodic compliance monitoring performed by the Billings office of the Water Quality Bureau. The establishment of a biological laboratory at Miles City should improve the quality of self-monitoring throughout Southeastern Montana since its central location will enable time limited samples to be analyzed accurately.

Because of the rural nature of communities in the Yellowstone-Tongue area, no centralized system for municipal treatment systems will be developed. Rather, each incorporated community will be responsible for complying with any applicable water quality regulations, as they apply to that specific community. If the community is unincorporated the county within whose boundaries that community exists shall assume managerial responsibility. Since this is the status quo no time schedule is required for implementation.

The establishment of municipal point source regulations intended that an improved environment exist for the general population. As a member of a society, each community is required to contribute to the elimination of pollutants to the national watershed. This sometimes places economic burdens upon small rural communities whose total wastewater discharges, as presently treated, have relatively little impact on receiving bodies of water. Examples of these situations are Broadus, Rosebud, Ekalaka, and Hysham. These communities should be given special consideration when determining the cost-effectiveness of treatment systems. Regulations should have

the flexibility to correlate secondary standards to the intended use of receiving waters and those waters' natural limitations.

Eleven municipalities currently hold permits for wastewater treatment discharges. Two of these are handled by the federal permit system, while the remainder are administered by the State. Both water plants at Forsyth and Miles City are closed circuit, that is, both return their filter backwash to the pre-sedimentation basins, eliminating discharge to the Yellowstone River.

TABLE 1.

MUNICIPAL WASTEWATER TREATMENT FACILITIES

Community	Existing Facility	Design Pop.	1970 Pop.	Equiv. 1976 Pop.	Est. 1996 Pop.
Ashland-St. Labre	2-cell lagoon		531	1,500	
Ashland Homes	2-cell lagoon	-	-	84	
Baker	3-cell lagoon	3,000	2,584	2,900	
Belle Creek	2-cell lagoon	100	300	150	
Birney Village	Septic Tanks	-	-	80	
Broadus	2-cell lagoon	670	799	800	
Busby	2-cell lagoon	300	300	468	
Cosltrip	3-cell lagoon	4,000	200	2,680	
Ekalaka	Activated Sludge	750	663	660	
Forsyth	2-cell lagoon	750	1,873	2,450	
Hysham	2-cell lagoon	600	350	620	
Lame Deer	3-cell lagoon (10 acres)	1,000	650	1,550	
Miles City	3-cell lagoon	12,000	9,023	11,000	
Muddy Creek Homes	2-cell lagoon	-	-	80	
Plevna	2-cell lagoon	210	189	170	
Rosebud	Septic Tanks	-	225	178	
St. Labre	2-cell lagoon	-	250	1,085	

TABLE 2.

SUMMARY OF EXISTING FACILITIES

Community	Existing Facility	Size	Discharges	Permit Number	Expir. Date
Ashland St. Labre	2-cell lagoon	18 acres	No Dis.	No Permit	-
Ashland Homes	2-cell lagoon	1.4 acres	Intermit.	No Permit	-
Baker	3-cell lagoon	30 acres	Cont.	22381	
Belle Creek	2-cell lagoon	0.75 acres	Intermit.	22501	
Birney Village	Septic Tanks	-	-	No Permit	-
Broadus	2-cell lagoon	6.75 acres	Intermit.	22110	
Busby	2-cell lagoon	3 acres	Intermit.	No Permit	-
Colstrip	3-cell lagoon		Intermit.	22373	
Ekalaka	Activated Sludge	75,000 gpd	Cont.	20371	
Forsyth	2-cell lagoon	8.0 acres	Cont.	21288	
Hysham	2-cell lagoon	5.0 acres	Cont.	21709	
Lame Deer	3-cell lagoon	10 acres	Cont.	23141	
Miles City	3-cell lagoon	118 acres	Cont.	23612	
Muddy Creek Homes	2-cell lagoon	1 acre	No Dis.	No Permit	-
Plevna	2-cell lagoon	2.1 acres	Intermit.	21776	
Rosebud	Septic Tanks	-	-	No Permit	-
St. Labre	2-cell lagoon	2.0 acres	No Dis.	22985	12/31/78

TABLE 3.

ASSUMED SITUATION AS OF JANUARY 1, 1978

YTAPO CONSTRUCTION GRANT PRIORITY LIST

(SITUATION AS OF AUGUST 1, 1977)

	Stream* Segment	Water$^{\Phi}$ Use	Population Served	Scope of Project	Facility Plan Approval	Total Points
Miles City**	6	2	3	40	10	61 (61)
Forsyth**	6	2	2	30	10	50 (50)
Baker	6	2	2	30	10 (0)	50 (40)
Broadus	6	2	1	30	10 (0)	49 (39)
Hysham**	6	2	1	30	10 (0)	49 (39)
Lame Deer	6	1	2	30		40 (40)
Busby	6	2	1	30		39 (39)
Ekalaka	6	2	1	25		34 (34)
Miles City Sewers	6	2	1	15		24 (24)
Ashalnd-St. Labre	6	2	2			10 (10)
Colstrip	6	2	2			10 (10)
Rosebud**	6	2	1			9 (9)
Alzada	6	2	1			9 (9)
Ashland Cluster	6	2	1			9 (9)
Belle Creek	6	2	1			9 (9)
Birney Village	6	2	1			9 (9)
Ismay	6	2	1			9 (9)
Muddy Creek Homesites	6	2	1			9 (9)
Plevna	6	2	1			9 (9)

*All stream segments were classified as effluent limited with respect to BOD_5.

$^{\Phi}$Utilizing present system. The YTAPO will recommend modifications of the classification.

**Discharge upstream from city utilizing river water for drinking supply.

By January 1, 1978, and without the help of construction grant monies, the following is assumed:

Rosebud will have built a collection and treatment system; Ashland will have completed a collection and treatment system; Baker, Broadus, and Hysham will have approved facility plans.

Table 4. Construction Grant Priority Rationale
Assumed Situation as of January 1, 1978.

Miles City	61	In Step II, Designs & Spec's., will be constructing oxidation ditch in FY '78.
Forsyth	50	Step II, also constructing an oxidation ditch in FY '78.
Baker	50	Step I, may require Step II and Step III funding in FY '78.
Broadus	49	May require Step II and Step III funding in '78.
Hysham	49	Step I in process; doing detailed I & I study; may require Step II & III funding in '78.
Lame Deer	40	Plans and specs completed by Indian Health Service. Construction funds available from IHS possibly by FY '79.
Busby	39	Funding for any upgrading would most likely come from IHS.
Ekalaka	34	No Step I done or in process. Presently operating an activated sludge plant sufficient clarifier unit.
Miles City Sewers	24	Will be constructed in conjuntion with treatment system.
Ashland-St. Labre	10	Recently completed construction of a 2-cell lagoon. Plans include an additional cell should it be needed.
Colstrip	10	Constructing oxidation ditch treatment system.
Rosebud	9	Step I completed, designs and spec's of sewage collection and treatment systems funded by HUD and coal tax.
Alzada	9	Individual systems, no discharge.
Ashland Cluster	9	Will build a third cell to provide secondary treatment. Funds were provided by Public Health Service.

Table 4. (cont.)

Belle Creek	9	Two-cell lagoon--No change planned.
Birney Village	9	Individual systems, no discharge. Will construct a lagoon system.
Ismay	9	Individual systems, no known plans for centralization.
Muddy Creek Homesites	9	Have a non-discharging lagoon system.
Plevna	9	Two-cell lagoon which seldom discharges--no change planned.

June 22, 1977

MONTANA STATE DEPARTMENT OF HEALTH
AND ENVIRONMENTAL SCIENCES

PRIORITY SYSTEM FOR
EPA CONSTRUCTION GRANTS

I. The following priority evaluation system is established by the State Department of Health and Environmental Sciences for the allocation of federal grants to municipalities for sewage treatment works construction. This system is based on:

1. Severity of population problem
2. Population affected
3. Need for preservation of pure waters
4. National priorities

The state's construction needs list and ranking of projects will be submitted to EPA by Aug. 1 of each year. From this list, the highest priority projects for which there is money available will receive a notice of project priority. Before receiving an actual priority certification, scheduling for the project must meet department approval.

II. Projects shall be rated as follows:

1. Stream segment designation*

a. (i) Water quality limited due to municipal wastewater discharge or a combination of municipal and industrial wastewater discharges.	8
(ii) Water quality limited due to a combination of municipal, industrial and nonpoint discharges which create or have the potential of creating a lake eutrophication problem.	
b. Effluent limited.	6
c. Water quality limited due to nonpoint discharges in combination with municipal and/or industrial discharges not covered by a. (ii) above.	4
d. Water quality limited due to nonpoint sources or abandoned acid mine discharges.	2

2. Water-use classification of stream receiving discharge:

a. $B\text{-}D_1$ or higher	6
b. $B\text{-}D_2$ or $C\text{-}D_1$	4
c. $B\text{-}D_3$ or lower	2

3. Population served by project:

a. 10,000 or greater	3
b. 1,000 to 10,000	2
c. Less than 1,000	1

4. Scope of the project in abating pollution:

a. Projects previously issued abatement orders by the Department's executive officer 40

b. Construction to achieve compliance with requirements of the Montana Pollutant Discharge Elimination System permit program including, where applicable, interceptor sewers, outfall sewers, pumping stations and associated appurtenances related to the project. Priority points will be awarded in one of the following categories.

1. i) Improved treatment or new treatment to replace existing facilities that are hydraulically and/or organically overloaded such that, to the potential detriment of the receiving stream, inadequate treatment is accomplished or potential health hazards or nuisances result;

ii) new treatment facilities to serve existing untreated discharges, where treatment facilities are cost-effective solution to the problem;

iii) Cost-effective infiltration/inflow reduction 30

2. Improved treatment or new treatment to replace existing facilities that are not capable of meeting effluent limitations on a year-round basis, but achieve a level of treatment consistent with the requirements of the receiving stream. Included in this category are conventional lagoon systems whose discharge normally causes no violation of receiving stream water quality standards or any health and nuisance problems. 25

3. Elimination of raw sewage bypasses as required by the MPDES permit system 25

c. Elimination of individual disposal systems that presently create localized public health problems or hazards. Eligible costs would include the treatment works, with collection system cost eligibility to be determined by the latest federal policy. Points will be awarded in the following categories:

1. Soil and/or groundwater conditions result in adequately documented widespread and year-round hazards, such as surfacing sewage, well contamination and inadequate disposal of wastewater 30

2. Localized and/or seasonal problems resulting from inadequate individual disposal systems 15

d. New or expanded sewerage systems to relieve existing systems or increase existing service area, with eligibility to be determined by the latest federal policy. 15

e. Separation of storm and sanitary sewers to prevent bypassing 10

5. Phase construction:

a. Grant previously awarded on prior phase of project and new grant needed for next phase to keep project on schedule. 30

III. Where more than one project has the same number of priority points, further rating of the projects will be based on population equivalent served by the project.

IV. Projects which are certified by the state for federal grant participation but do not receive a grant agreement prior to the end of the fiscal year will receive an additional 50 points. Such points will be applied to their total point value for the following fiscal year.

V. Projects which have fulfilled the requirements of a "Step 1" grant and have an approved facility plan will receive an additional 10 points at the time of a scheduled priority review. Priority reviews will be held at least annually with more frequent reviews contingent upon the availability of unobligated funds.

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*Water quality limited means that to protect the streams with this designation, treatment greater than the general minimum treatment levels established for wastewater are needed to meet stream water quality criteria.

Effluent limited means that the general minimum treatment levels established for wastewaters are ample to meet stream water quality criteria.

The general minimum treatment level for domestic sewage is secondary treatment. For new sources of wastewater, the state's anti-degradation statement is applicable.

The following is the state's proposed priority list with a few corrections the YTAPO thinks should be added.

PROPOSED FY78 PRIORITY LIST

COMMUNITY	STREAM SEGMENT	WATER USE	POPULATION	SCOPE	FACILITY PLAN APPROVAL	TOTAL
Butte-Silver Bow Co.	8	2	3	40	10	63
Miles City	6	2	2 3	40	10	60 61
Eureka	6	6	2	30	10	54
Three Forks	6	6	2	30	10	54
Hardin	6	4	2	30	10	52
Forsyth	6	2	2	30	10	50
Thompson Falls	6	6	2	25	10	49
Havre East	4	2	1	40		47
Whitefish	8	6	2	30		46
Columbia Falls	8	6	2	30		46
Polson	8	6	2	30		46
Gallatin Co. RID 305	8	6	2	30		46
Bozeman	8	4	3	30		45
Anaconda	6	6	3	30		45
Bigfork	8	6	1	30		45
Livingston	6	6	2	30		44
Dillon	6	6	2	30		44
Libby	6	6	2	30		44
Hamilton	6	6	2	30		44
Red Lodge	6	6	2	30		44
Big Timber	6	6	2	30		44
Choteau	6	6	2	30		44
Townsend	6	6	2	30		44
Ronan	6	6	2	30		44
Boulder	6	6	2	30		44
Plains	6	6	2	30		44
Whitehall	6	6	2	30		44
Kalispell	8	2	3	30		43
Lolo	6	6	1	30		43
Manhattan	6	6	1	30		43
Sheridan	6	6	1	30		43
Sunburst	6	6	1	30		43
Absarokee	6	6	1	30		43
Darby	6	6	1	30		43
Ennis	6	6	1	30		43
Drummond	6	6	1	30		43
East Glacier	6	6	1	30		43
Roberts	6	6	1	30		43
Hobson	6	6	1	30		43
Lewistown	6	4	2	30		42
Laurel	6	4	2	30		42
Harlowton	6	4	2	30		42
Browning	6	4	1	30		41
Chester	6	4	1	30		41
St. Ignatius	6	4	1	30		41
Hot Springs	6	4	1	30		41
Rocker	8	2	1	30		41
Deer Lodge	4	4	2	30		40
Wolf Point	6	2	2	30		40
Baker	6	2	2	30		40
Chinook	6	2	2	30		40
East Helena	6	2	2	30		40

COMMUNITY	STREAM SEGMENT	WATER USE	POPULATION	FACILITY PLAN SCOPE	APPROVAL	TOTAL
ut Bank	6	6	2	25		39
hite Sulphur Springs	6	6	2	25		39
ig Sandy	6	2	1	30		39
roadus	6	2	1	30		39
ildford Hysham	6	2	1	30		39 39
alta	4	2	2	30		38
arm Springs	4	2	2	30		38
odge Grass	6	6	1	25		38
oliet	6	6	1	25		38
weetgrass	6	6	1	25		38
ridger	2	4	1	30		37
reat Falls	4	4	3	25		36
alier	6	4	1	25		36
innett	6	4	1	25		36
udith Gap	6	4	1	25		36
idney	6	2	2	25		35
arlem	6	2	2	25		35
est Glendive	6	2	2	25		35
ower-Teton Co.Wtr.Asso	2	2	1	30		35
lentywood	6	2	2	25		35
airview	6	2	2	25		35
ircle	6	2	1	25		34
erry	6	2	1	25		34
kalaka	6	2	1	25		34
tanford	6	2	1	25		34
enton	6	2	1	25		34
ysham	6	2	1	25		34
aco	6	2	1	25		34
odson	6	2	1	25		34
ocky Boy	6	2	1	25		34
avage	6	2	1	25		34
airfield	2	4	1	25		32
romberg	2	4	1	25		32
ashua	4	2	1	25		32
herry Creek RID (Glasgow)	4	2	1	25		32
issoula Sewers	8	6	2	15		31
hitefish Sewers	8	6	2	15		31
alispell Evergreen	8	6	2	15		31
akeside	8	6	1	15		30
illow Creek	8	6	1	15		30
msterdam-Churchill	8	6	1	15		30
ozeman Sewers	8	4	2	15		29
illon Sewers	6	6	2	15		29
roy	6	6	2	15		29
ivingston Sewers	6	6	1	15		28
olo Sewers	6	6	1	15		28
orvallis	6	6	1	15		28
lm	6	6	1	15		28
wan Lake	6	6	1	15		28
lyde Park	6	6	1	15		28
oore	6	6	1	15		28
elrose	6	6	1	15		28
arrison	6	6	1	15		28

COMMUNITY	STREAM SEGMENT	WATER USE	POPULATION	FACILITY PLAN SCOPE	APPROVAL	TOTAL
Fort Shaw	6	6	1	15		28
Martinsdale	6	6	1	15		28
Arlee	6	6	1	15		28
Pinesdale	6	6	1	15		28
Bearcreek	6	6	1	15		28
Cooke City	6	6	1	15		28
Great Falls Sewers	4	4	3	15		26
Butte Sewers	8	2	1	15		26
Lewistown Sewers	6	4	1	15		26
Conrad	6	4	1	15		26
St. Ignatius Sewers	6	4	1	15		26
Loma	6	4	1	15		26
Roy	6	4	1	15		26
Helena Sewers	6	2	2	15		25
Helena Valley	6	2	2	15		25
Ashland	6	2	2	15		25
Lincoln	2	6	2	15		25
Billings Sewers	4	2	3	15		24
Miles City Sewers	6	2	1	15		24
Sidney Sewers	6	2	1	15		24
Roundup Sewers	6	2	1	15		24
Stockett	2	6	1	15		24
Simms	2	6	1	15		24
Rosebud	6	2	1	15		24
Kremlin	6	2	1	15		24
Outlook	6	2	1	15		24
Geyser	6	2	1	15		24
Whitewater	6	2	1	15		24
Carter	6	2	1	15		24
Square Butte	6	2	1	15		24
Havre Sewers	4	2	2	15		23
Kalispell Storm Sewer	8	2	3	10		23
Billings Heights	4	2	2	15		23
Huntley	4	2	1	15		22
Great Falls Storm Sewer	4	4	3	10		21
Chinook Storm Sewer	6	2	2	10		20

Table 5. PERMIT RECOMMENDATIONS

	BOD_5	TSS	Fecal	Comments
Alzada	-	-		No permit required--individual systems--no discharge.
Ashland Cluster	30	100		Shouldn't need a permit under proposed system. (Occasionally discharging without permit).
Ashland-St. Labre	-	-		Designed to be non-discharging.
Baker	30	100		
Belle Creek	30	100		
Birney Village				No discharge occurring--individual treatment systems.
Broadus	30	100		
Busby	30	100		Need a discharge permit.
Colstrip	30	30	200	Oxidation ditch treatment.
Ekalaka	50	50	200	Activated sludge treatment.
Forsyth	30	30	200	Oxidation ditch.
Hysham	30	100		Correcting an I & I problem.
Ismay	-	-		Individual systems.
Lame Deer	30	100		Will be building a new lagoon system.
Miles City	30	30	200	Oxidation ditch.
Muddy Creek Homesites	-	-		No discharge occurring.
Plevna	30	100		Discharge occasionally.
Rosebud	-	-		No discharge occurring.

URBAN AND INDUSTRIAL STORM WATER NEEDS

Forsyth, due to its present size, potential for growth, limited room for a real expansion, and proximity to the Yellowstone River has been given special attention towards the management of storm water. Presently it depends on the general topography to provide surface drainage, collection and discharge through a dike between Forsyth and the river. The summary of the storm water study funded by YTAPO follows.

FORSYTH STORM WATER STUDY SUMMARY

This study investigated the existing storm drainage system in the City of Forsyth and analyzed some alternative long term and short term solutions.

The study also applied research data from the U.S. Corps of Engineers, in lieu of taking site specific samples, to determine the potential waste loads that could result from storm water runoff.

There is a definite need for a storm drainage system in the City of Forsyth. It may be in the best interest of the City to apply some of the temporary control measures outlined in the report. The construction of a complete, conventional storm water drainage system without the parallel reconstruction of several streets would be undesirable. The control of runoff via paved streets and curbs and gutters is a part of the whole storm drainage system. Also, it is possible for buildings to be constructed so that the surroundings will not drain to the street.

A combined storm water/wastewater sewer system is not legally and physically practical for the City of Forsyth. A sectionalized drainage system (Alternative II) may be possible as an interim measure. A conventional storm drainage system (Alternative I) appears to be the only long term corrective action.

To function properly, the storm drainage system (Alternative I) should be combined with a street reconstruction program and the adoption of environmental performance standards. Even this system would not eliminate the ponding of water after severe storms.

The street reconstruction program is needed to provide localized drainage. A street sweeping program should follow the reconstruction program to minimize the amount of contaminants carried by the runoff.

Performance standards are needed to prevent the system from being overloaded in the future and to reduce the amount of contaminants entering the runoff. The basis of these standards is that the runoff after development should not exceed the runoff that occurred prior to development. This report elaborates upon the techniques.

For a cost of just over $800,000 the City of Forsyth could install a conventional storm drainage system. Road reconstruction and the adoption of performance standards for new construction would be a part of the system.

This system would alleviate most of the minor ponding of storm water now occurring in Forsyth, but would not eliminate temporary ponding during very severe storms.

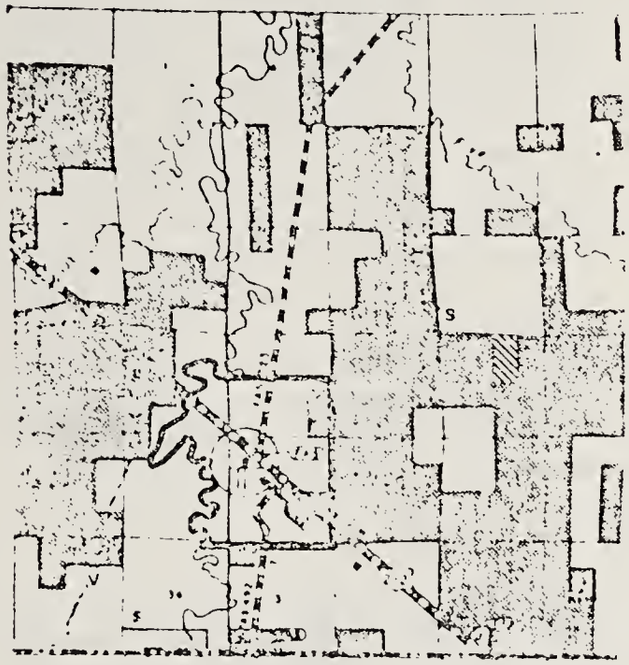
Miles City has cooperated with the YTAPO in studying its storm water situation. Lack of snowmelt runoff and good timing following thunderstorms has hampered getting statistically valid data. However, preliminary investigation has shown a BOD_5 loading of less than 10 mg/l. Part of the system discharges directly to the Tongue River, while another empties into a slough area which acts as a natural settling area before discharging to the Yellowstone River.

In general it appears that the collection and discharge of municipal storm water has very little impact on the water quality of streams in the

designated area. The relatively small amount of municipal area drained in relation to the project area does not justify structural storm water treatment systems. Rather a program of street cleaning, limited use of road salts during winter icing conditions, and general maintenance of curbs and streets should provide the type of managerial control needed to avoid future degradation of streams.

MUNICIPAL SERVICE AREAS

Within the Yellowstone-Tongue 208 area there are 17 communities that possess, or can reasonably be expected to have potential for, centralized sewage treatment facilities (Table 12). Of these, 14 presently do have at least a partially centralized system. After preliminary study of population projections and general topographic limitations the following service areas were delineated. Comments are being solicited concerning the shown boundaries and will be incorporated into the final report.



ALZADA, is one of three communities with no central system, or organized plans for any in the foreseeable future. Originally called Stoneville, Alzada has been a stable ranching service community with a 1970 census population of 50.

Recent activity in hard-rock mining of uranium has had limited impact on Alzada because of a lack of readily available space for housing and water and sewer services. Should uranium activity increase, enough impetus might be provided to develop space and services. Uranium might feasibly be strip mined at a future date.

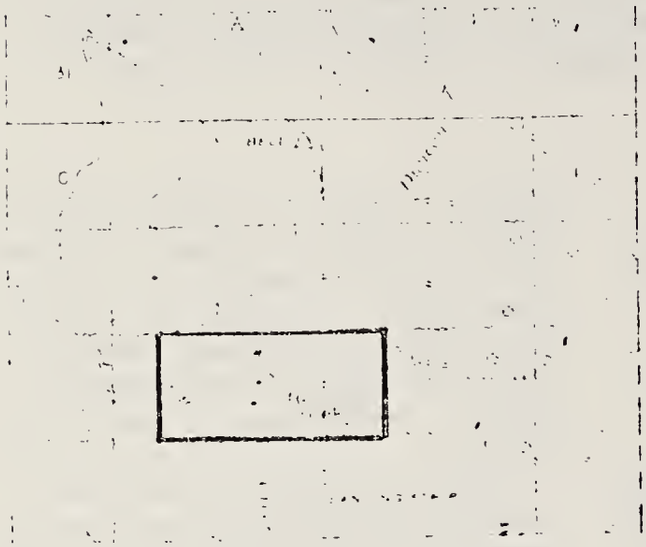
The City of BAKER presently operates a 3-cell lagoon designed for 3,000 people. Construction has begun on a locally planned fourth lagoon to facilitate storage and evaporation.

The YTAPO has funded a facilities planning effort for the City of Baker and the surrounding area. This was begun in March, 1977, at the request of the Fallon County Commissioners, and will be completed by October, 1977.

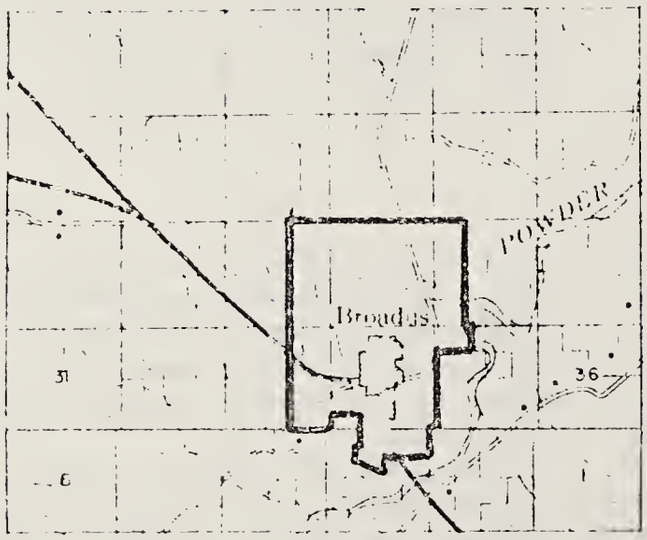
An analysis of several treatment alternatives to determine the most cost-effective method of treating additional loads generated by subdivisions located near

Baker is proceeding. At least one subdivision is on septic tanks, and renewed oil activity has pressured development. Also, a small coal field lies nearby with potential for economic development.

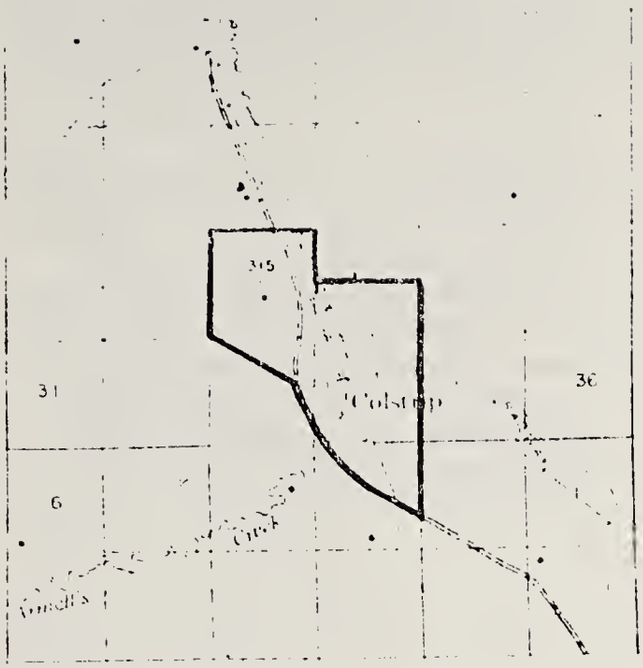
Baker's wastewater treatment facilities should be in operation by the end of 1978. Summary of Baker's facilities plan will be added upon completion of the plan, October, 1977.



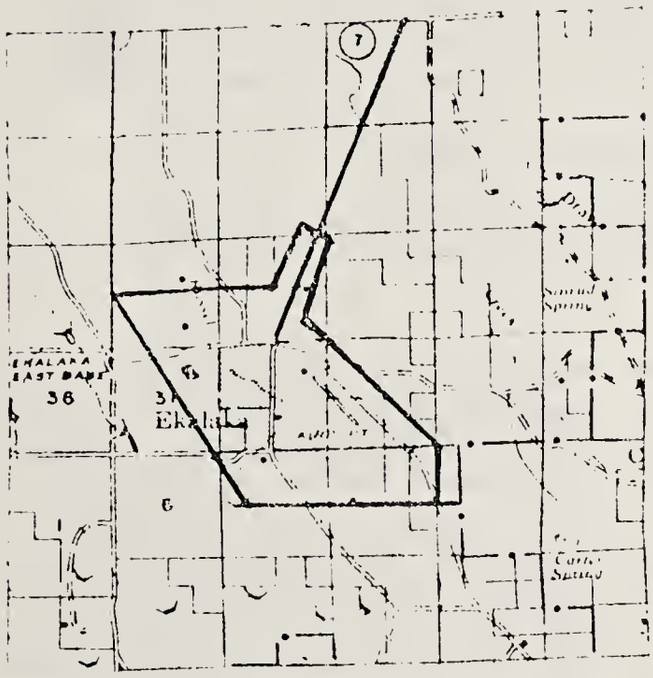
BELLE CREEK is a company operated community, with sewer and water provided by Gary Operating Company. Sewage treatment is accomplished with a 2-cell lagoon. The town is less than ten years old, formed during the oil boom that is still responsible for its existence. Trailer court space is available for possible expansion. Gary Operating has been granted funds from the Energy Research and Development Administration for a tertiary recovery study, which could influence growth to a small degree in the area. No change is anticipated for the Belle Creek treatment system.



BROADUS is one of five communities in the 208 area that has done 201 facilities planning. A 3-stage development plan has been developed for different levels of growth anticipated for Broadus, stage one being historical growth trend, stage two as moderate growth due to coal activities, and stage three for rapid growth due to energy conversion. Presently a 2-cell lagoon designed for 650 people serves the community. Broadus will probably elect to eliminate its discharge through irrigation for a temporary period of time, five years or more, and wait for construction of major facilities until more is known about the type of development that will take place due to coal extraction and conversion. A summary of the Broadus Facilities Plan will be added upon completion of that report, September, 1977.



COLSTRIP, another company owned town, but with publicly owned (Rosebud County) sewage treatment facilities, has a private consulting firm doing its own planning. Its present owner, Western Energy, has plans of divesting its interest in the town of Colstrip, changing it to a totally public entity in the future. A 3-cell lagoon, which has only recently begun discharging, serves Colstrip. It will be replaced by an oxidation ditch by 1979. Future growth or decline is very much dependent on government and company decisions to build additional energy conversion units or expansion of coal mining for export.



EKALAKA, is the only town in the 208 area that presently uses activated sludge for sewage treatment. Two other towns have decided to use this process, in the form of oxidation ditch facilities. The plant has had several maintenance problems, involving pumps, piping, building, and correct operation. The plant has been repaired, and is now operating as designed. No clarifier is used before discharge to Russell Creek which results in a rather high suspended solids value. However, the creek has no fishery due to its ephemeral characteristics and downstream use is limited to private stock watering, so it is doubtful that Total Suspended Solids will create a problem downstream.

The first community in the 208 study area to request 201 facilities planning was FORSYTH. A severely impacted area, its population has grown between 50 and 60 percent since 1970. The study has been completed, along with Step II, detailed design and specifications, Forsyth will be building an oxidation ditch designed for a population of 5,000.

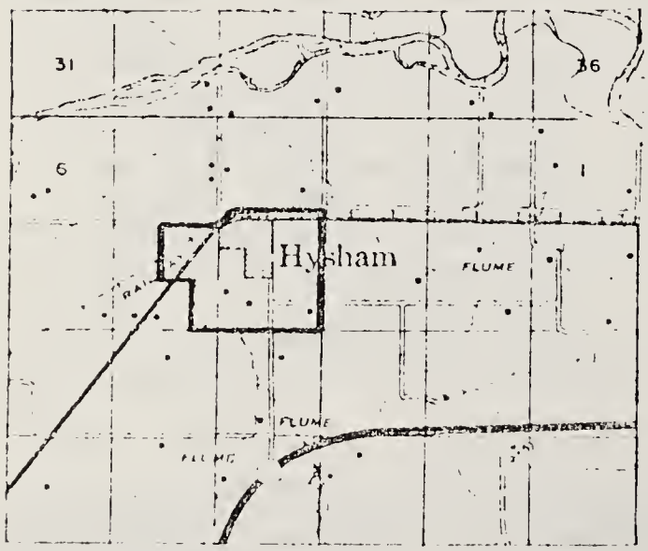
Operations at the Colstrip coal mine and conversion complex have been major influences on growth. Forsyth itself is in a closed basin due to diking of the Yellowstone River for flood protection. The area is subject to storm drainage problems for which an engineering firm is on contract to provide a workable solution. Coal tax money has already been allocated to Forsyth for other impact areas, and might be available for upgrading treatment facilities.

FORSYTH FACILITIES PLAN SUMMARY [1]

Forsyth has elected to replace an overloaded two cell stabilization pond with an oxidation ditch treatment system designed for a population of 5,000 people. The estimated cost of this facility is $541,000. It is expected that construction grants funding will be available for as much as 75% of that total and likely that coal tax funding will assist with the remainder.

Discharge from this system will be continuous to the Yellowstone River and a permit will be required.

The present population, by the special 1976 census is 2,642, a 41% increase from the 1,873 people counted in the regular 1970 census.



During the spring of 1977, HYSHAM made major revisions to its water supply and sewer system. It was discovered during the 201 facilities stage, that an excessive amount of infiltration was taking place. In order for detailed analysis to be done, which in turn was necessary to complete the 201 plan, some 4 inch sewer pipe would have to be replaced and several manholes installed. Once the detailed analysis is finished, the final engineering of the 201 plan can be finished. Presently the town operates a 2-cell lagoon which could

[1]Morrison-Maierle, Inc., June 1976, Facility Plan for Forsyth, MT.

become inadequate due to coal development in the area. An upgraded system should be capable of acheiving secondary treatment by December, 1978. A summary of the Hysham surficial groundwater study follows. The summary of the Hysham Facilities Plan will be added upon completion of the report, October, 1977.

HYSHAM FACILITIES PLAN SUMMARY (As of August 26, 1976)

Under the guidelines of Public Law 92-500, construction grant applicants are to investigate the condition of their sanitary sewer system and show, to the satisfaction of the regional administrators, that the collection system, after completion of any required rehabilitation, is not subject to excessive infiltration or inflow.

A general analysis of the system and a review of the interviews show that there is an area of the town that has a constant source of groundwater entering the sewer system. There has also been periodic increases in the flows due to inflow or surface water entering the system.

Since the community is not too large, the system was studied as a whole. Flow measurements were taken at a key manhole to establish if and where a complete physical survey would be required.

Based on the results of these investigations, it can be concluded that:

1. Certain areas of the town have been subject to excessive inflow. During the first attempt to install a portable flow meter in Manhole No. 10, it was discovered that the system was surcharged from the lift station back into town to Manhole No. 2 (see the enclosed map in Appendix A). This incident occurred on July 6, 1976, and it was not until July 12, 1976, that the flows had normalized and the flow meter was installed.

   Upon investigating the area, it was discovered that the fields to the south and west of town were being irrigated. The town's sewer outfall lies in the natural drainage area which drains both irrigation and storm runoff from these fields.

   A broken pipe was found in this area, and has been fixed. Since that time no surcharging has appeared.

2. A certain portion of the town's sewer is laying in groundwater, and flow data indicates that there are 23 gallons per minute entering the system from approximately 6,760 feet of sewers.

3. Because of the above indicated infiltration in lines that are below the groundwater table, it is very probable that the lines above the groundwater are exfiltrating and very likely contaminating the groundwater.

Since August, 1976, Hysham has applied for funding of a detailed I & I study as well as for installation of manholes and replacement of 4" sewers with 8" sewer line to facilitate the study. The construction work has been

finished and the facilities plan should continue as soon as the I & I study is complete. It is expected that the plan will be ready for approval by the end of 1977.

HYSHAM GROUNDWATER STUDY SUMMARY[2]

The purpose of this report is to summarize the results of a shallow groundwater investigation of Hysham, Montana, for the Yellowstone-Tongue Areawide Planning Organization. The objectives of the study were to: (1) utilize existing data where possible to conduct a general inventory of existing high water table and salinity problems in Hysham; and (2) compare and analyze groundwater control methods to relieve high water table conditions in Hysham.

Utilizing existing Soil Conservation Service data in the Hysham area plus additional data gathered by HKM Consultants, it was concluded that: (1) high groundwater conditions (less than 5 feet below the land surface) are present only in the northwest part of Hysham, west of Division Street; (2) movement of groundwater in the Hysham area is generally north through Hysham to the Yellowstone River; (3) that irrigation is a significant contributor to the surficial groundwater in the area; (4) the quality of the shallow groundwater is generally poor with an estimated dissolved solids content ranging between 500 and 2,300 mg/l.

Three central drain systems were considered to reduce the groundwater level to a maximum of seven feet below the land surface in the northwest part of Hysham. The first, Alternative 1 would utilize collectors located in the northwest part of town to collect and discharge an estimated 0.48 cfs to Box Elder Creek. Alternative 2 would use virtually the same collector system as Alternative 1 but discharge the collected water to the sanitary sewer system for treatment and eventual disposal by the City's wastewater system. Alternative 3 would attempt to intercept the subflow before it entered the northwest part of Hysham and dispose of the collected groundwater to Box Elder Creek. Estimated total costs for each of the three alternatives are as follows:

Alternative 1 - $115,600
Alternative 2 - $295,800
Alternative 3 - $ 67,940

All alternative central systems would relieve high water table conditions such that flooding basements should not be a problem. None of the systems, however, would completely eliminate groundwater problems with regards to the sanitary sewers.

Based on the above, it's recommended that individual structure drainage systems be considered rather than a central drain if flooding basements are the main concern in Hysham. Such individual systems are estimated to range in cost between $1,500 and $2,000 each.

Should a central drain system be desired, it is recommended that Alternative 3 be adopted. Selection of this alternative would require detailed soils and site investigations before it could be designed and constructed.

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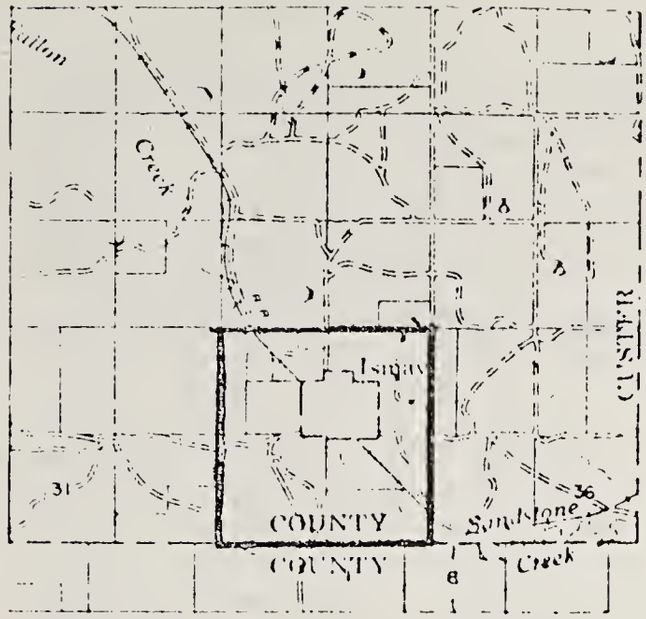
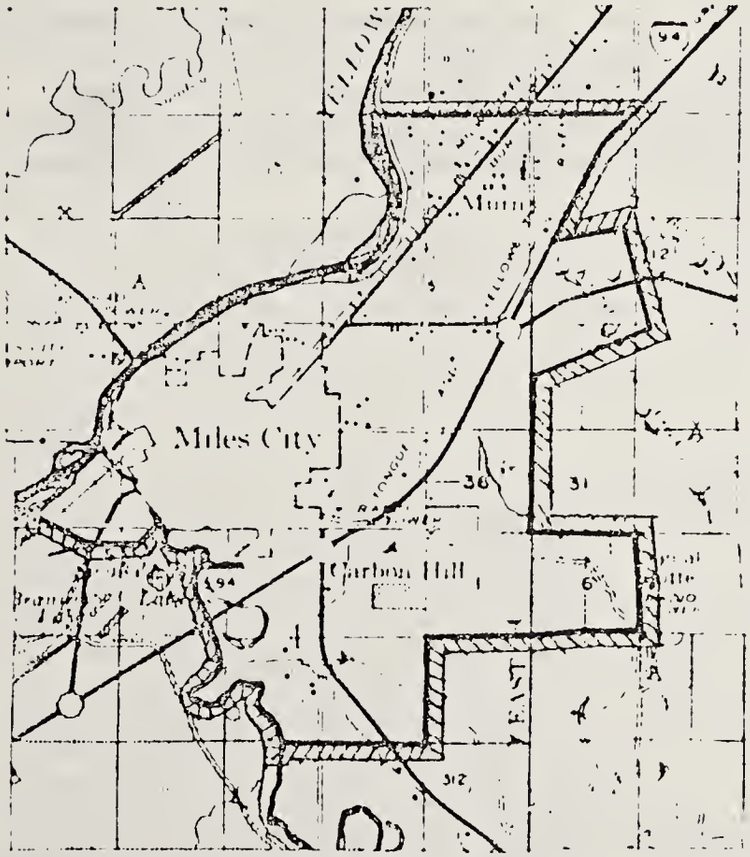
[2]Study of the Quality of the Surficial Groundwater Formation, Hysham, Montana, October 20, 1976; HKM Consultants.



ISMAY, is a community situated on O'Fallon Creek between Baker and Terry, with no plans of centralizing sewage treatment.

Should coal development take place in Southern Fallon County, growth could exceed past trends. However, it seems likely that population inflows will bend to gravitate towards the more established communities in the area.



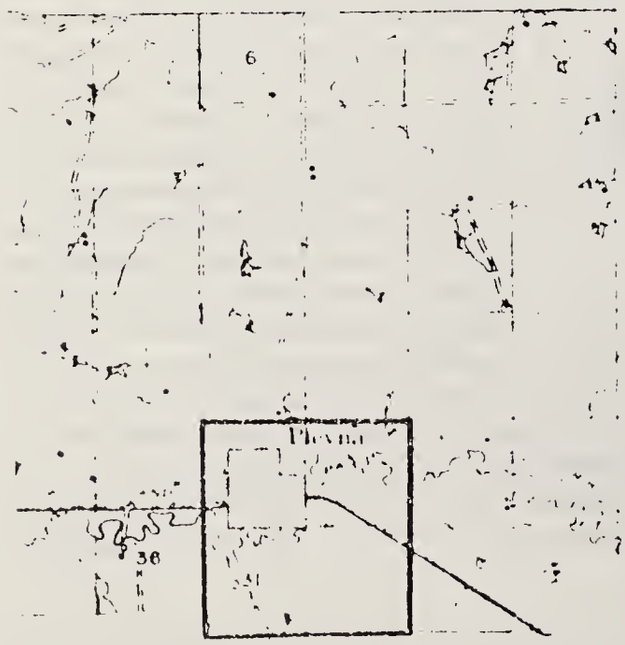
MILES CITY, the largest city in the Yellowstone Tongue 208, has completed a 201 study initiated before the 208 was in existence. The study has been incorporated into a study of a larger area, delineated on the map, in order to arrive at workable regional solution to growth problems in the Miles City area. Recent coal developments have caused considerable growth in the surrounding environs which were not included in the original 201 study. A sewer and water district was formed in May of 1976, to handle those problems, mainly to the south and east of Miles City, that would result from a relatively high density living pattern, high groundwater due to irrigation and alluvial water tables, poor ground and surface water drainage, and political maneuverings in the city and county. The city presently operates a 3-cell lagoon which is inadequate.

Detailed designs and specifications have been drawn for an oxidation ditch treatment facility which will accomodate growth up to 18,000 people, including the areas delineated above.

MILES CITY FACILITIES PLAN SUMMARY

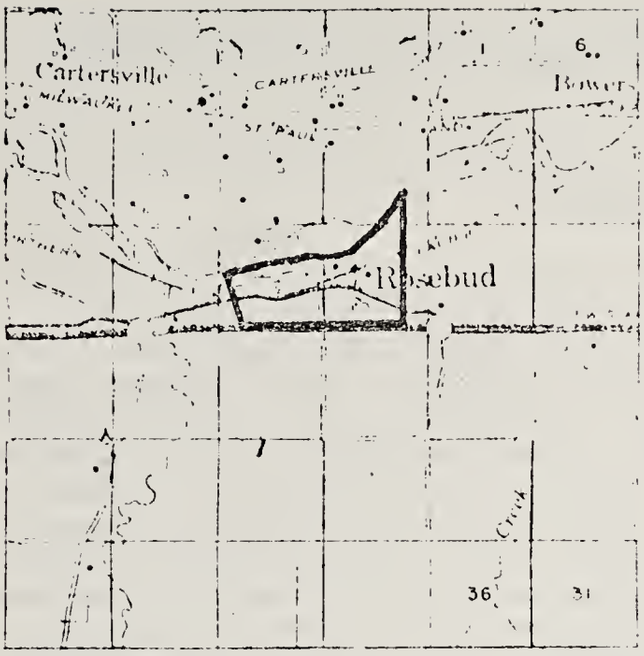
The Miles City facilities plan has evolved over a period of three years, from a proposal to aerate the city's wastewater, store it over winter, and use it for irrigation to the present approved plan of treatment via oxidation ditch. The engineers will use 18,000 people as design population. This was arrived at over much deliberation involving Miles City, the YTAPO, the Water Quality Bureau, and the EPA. The plan has progressed to the detailed design and specification (Step II) stage which is not expected to be completed until the spring of 1978. Paralleling this is the design of the Haynes Avenue and peripheral sewage collection network. A special water and sewer district was created in 1976 to devise a plan for orderly development south and east of Miles City. This district requested the YTAPO to help with the plan, at which time the project staff integrated the already written Miles City facilities plan. The sewer and water district has since applied for coal tax assistance in the amount of $ 1.8 million for financing of three-fourths of the cost of the main collection and water supply systems. The treatment facilities are estimated to cost $2.12 million of which 75% should be fundable through construction grants.

Presently the city has frequent odor problems associated with its facultative lagoon system. Residents living in and near Miles City have been tolerating this situation for some time with the expectation that something will be done soon. Therefore it is expected that a considerable amount of public support exists and that the plan will be implemented. However, delays have been the rule rather than the exception. It is expected that sewer and water pipe will be installed beginning in November, 1977, and completed by the summer of 1978.



PLEVNA, operates a 2-cell lagoon, which seldom discharges. The system seems to operate satisfactorily and the 208 staff does not anticipate rapid growth for Plevna.

Should energy development take place, Baker would be most likely to feel the impact of development before Plevna, due to the services provided by each community presently. This would give the area time to develop a workable plan for expansion.



The community of ROSEBUD, which does not have a centralized sewage treatment system, has completed a 201 facilities plan, funded by the YTAPO. The community will construct a centralized sewer system to be funded mainly by HUD. A facultative, non-discharging lagoon will treat the generated wastewater from a maximum of 400 people and store, if necessary, treated wastewater to be used for irrigation of an adjacent hay field. Rosebud is within driving distance of Colstrip, and has a large number of undeveloped lots west of the existing town. It is situated beside the Yellowstone River and has considerable potential for growth, due to coal activities in the area.

ROSEBUD FACILITIES PLAN SUMMARY[3]

A two cell stabilization pond has been designed for the community of Rosebud. A primary cell of 1.5 surface acres and a secondary pond of 3.7 acres will be used to treat and store the anticipated wastewater of 400 residents.

Initially Rosebud's equivalent population of 178 will not produce enough effluent to necessitate a discharge from the treatment system. With future population increases, evaporation, and percolation may not be able to dispose of all wastewater. In this case, nearby farmland is available for land application of the excess water. It is anticipated that a discharge to surface water will not occur and therefore a permit will not be required.

Rosebud has secured a $200,000 HUD grant for construction of a sewage collection system and has acquired an additional $51,000 for construction of the two cell treatment system.

Detailed design and specifications have been completed, bids are to be let in July, 1977 and construction is scheduled to begin in August, 1977.[4]

It was suggested at one of the public hearings in Rosebud that the least cost alternative, at least with the present situation, would be to repair or replace defective septic tank systems.

The community represented at the meeting opted, instead, to pursue the central collection and treatment system.

This was based largely upon the availability of HUD funding, and the resulting opportunity to upgrade the entire community's sewage disposal

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[3]Plains Engineering, 1976, EPA 201 Facilities Plan for the City of Rosebud, Montana. Ted Vore, 1977.

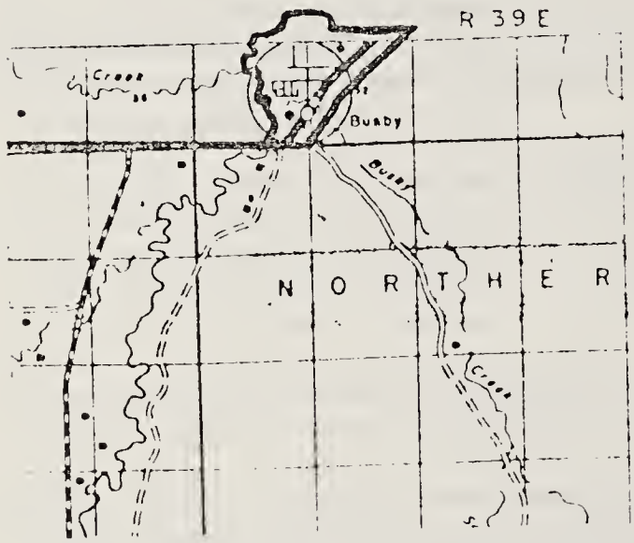
[4]Telephone conversation, May, 1977.

system. As a result of this decision the community can make better use of vacant and unused lots and eliminate troublesome surfacing of improperly designed septic systems.

COMMUNITY WASTEWATER FACILITIES INVENTORY

Northern Cheyenne Indian Reservation Communities

Five public sewage treatment facilities exist on the Northern Cheyenne Reservation. All are two or three cell facultative lagoon systems that serve from 80 to 1350 people. Several systems actively discharge effluent to subsurface seepage and evaporation. The primary sources of information concerning these facilities comes from the Indian Health Service which provided all the funds and technical assistance and the Northern Cheyenne Utilities Commission in Lame Deer which currently administers all facilities. An assessment of the lagoon systems on the reservation was presented in the "Water Quality Inventory and Management Plan, Middle Yellowstone River Basin, Montana", by the Water Quality Bureau of the Montana Department of Health and Environmental Sciences, 1975. Additional data for this report has been collected by the 208 staff of the Northern Cheyenne Research Project (NCRP).



The sewage disposal system for the Community of BUSBY consists of gravity mains and two-cell lagoon. The two cells total about 3.0 acres in surface area. This system serves a maximum population of 468 residents and includes 54 children in the Busby school dormitories. An undetermined number of households in Busby are on private disposal systems. At times there is no discharge due to excessive seepage and evaporation. For some periods, there is effluent discharge from a pipe that extends from the lagoons to Rosebud Creek. Measurement of influent and effluent flow rates in March 1977, were the same, 14 gpm. Busby's population has been gradually increasing and it appears the present lagoons may no longer be large enough to store enough winter flow or lose enough to seepage so that the system does not discharge. The additional water loss through evaporation during warm months usually precludes most or all discharge.

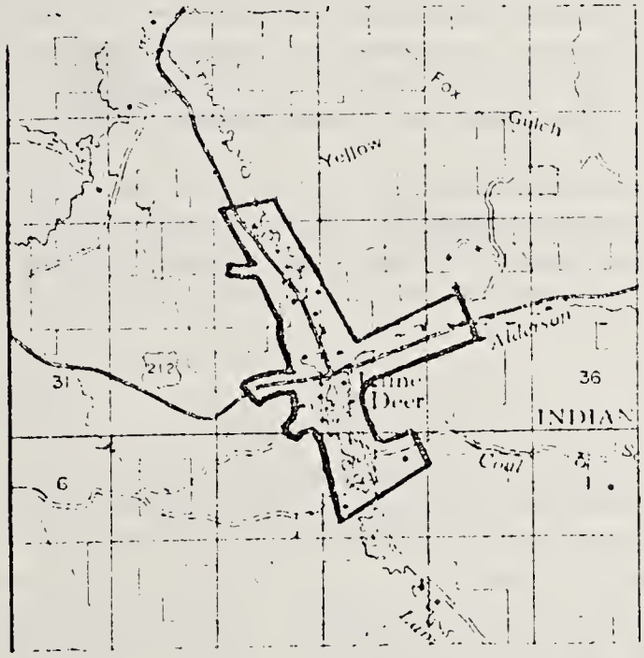
As long as the Busby system discharges during winter months, it will likely not meet EPA secondary effluent standards, in particular, fecal coliform and BOD. The system's overall impact on Rosebud Creek, however, is relatively small because of the low rate of discharge (14 gpm) in comparison to average streamflow (about 17 cfs average annual flow near Busby). Its greatest impact is likely on winter low flows which range from 7 to 20 cfs.

Monthly chemical analyses and several coliform analyses during 1976 and 1977 above and below the lagoon outfall failed to indicate any substantial impact on water quality from the lagoon system or Busby in general. In addition, Rosebud Creek carries a fairly high suspended solid load (400-700 ppm) and dissolved solid load (20-700 ppm).

MUDDY CREEK HOMESITES

The sewage disposal system at the Muddy Creek Homesites consists of gravity mains and a small two-cell lagoon. The total surface area of the lagoon system is about one acre. The system is servicing a population of about 80 people. Seepage from the lagoon is such that all the liquid percolated into the ground. There is no pollution problem expected from this percolation, thus, the system is nondischarging. Fecal coliform sampling of Rosebud Creek on July 13, 1976 above and below the lagoon system showed a higher count above the lagoons than below. This was due either to fecal coliform of animal origin or an unrepresentative sample.

Funding for this facility was under PL 86-121, administered by the Indian Health Service. If at some future time, a waste discharge permit is needed, it will be issued under the NPDES permit program.



The sewage disposal system for LAME DEER consists of gravity mains and a three-cell lagoon system. The surface area of the first two cells is about 4.8 acres and that of the third cell is about 5 acres. The first two cells are operated in parallel with the third cell being operated in series with the first two. This system serves a population of about 1350. Assuming that 1 acre of lagoon surface will adequately serve 100 people, the Lame Deer system is operating at or above capacity at present. An undetermined number of households within Lame Deer remain unserviced by the public sewer system and utilize various types of on-site private disposal methods.

Sampling results of influent and effluent show relatively efficient treatment of the waste load. One reason behind this is apparent goundwater inflow to the lagoons. The Indian Health Service engineer reports that two large springs were discovered seeping groundwater to the lagoons.[1R] The average sewage influent flow rate was figured to be 50 gallons per minute (gpm) while the lagoon discharge rate is 200 gpm. On this basis, 75% at the discharge is groundwater contributed directly into the lagoons.

Even with this dilution effect however, the present lagoon system is not consistently meeting EPA secondary effluent standards of 200 fecal coliform/100 ml and 30 mg/l of BOD. The high infiltration rate means that

winter flows cannot be fully stored and the resultant discharge has shown a high fecal coliform count in March 1977. Fecal coliform testing of Lame Deer Creek on July 13, 1976 resulted in 20 colonies/100 ml above the lagoon outfall and no colonies below. Another fecal coliform test on March 14, 1977 showed 70,000 colonies/100 ml in the effluent and 92,000/100 ml 100 feet downstream from the outfall. These results may be the result of unrepresentative samples or caused by septic tank seepage upstream, or may be of animal origin. BOD_5 levels in the effluent appear generally to meet the standard, however, one test in September, 1976 resulted in a BOD_5 of 64 mg/l. All suspended solids tests have given values far below the standards.

Monthly water sampling results of Lame Deer Creek during 1976-77 upstream and downstream from Lame Deer showed significant differences in water quality. Parameters such as sodium, chloride, sulfate, total dissolved solids and conductivity, were measurably higher at the sampling point about one-quarter mile downstream from the town and lagoon outfall. For example, average TDS above Lame Deer was 622 ppm, while below Lame Deer TDS averaged 719 ppm. Average TDS of the lagoon effluent was 887 ppm for three samples. With an average effluent discharge rate of 200 gpm or 0.45 cfs, the effluent comprises about 20% of the average flow in Lame Deer Creek of 2.64 cfs. At low flow times, the effluent comprises at least 36% of the resultant streamflow.

Not all the increase in TDS in Lame Deer Creek is caused by the sewage lagoon. Many seeps and springs contribute groundwater of higher dissolved solids content to the creek within Lame Deer. During low flows, the entire flow of the creek becomes influent to the groundwater and disappears beneath the surface. Just above the Highway 212 bridge the stream reemerges in a marshy discharge area.

The sum total of all increases in dissolved solids in Lame Deer Creek is not enough to preclude irrigation of hayfields by ranchers downstream from Lame Deer. At the point Lame Deer Creek empties into Rosebud Creek it is of similar or slightly better quality than the Rosebud which averages about 800 ppm TDS.

ST. LABRE MISSION

The community of Ashland, just east of the reservation, and the St. Labre Mission complex participated in the joint financing and construction of a new sewage treatment facility. The new two cell lagoon system was completed in the fall, 1976, just north of Ashland. Sewer mains and service lines were also installed during the latter part of 1976. Private hookups to the new system are taking place on an individual basis in Ashland when customers pay their hookup fees. At present, two of three possible lagoon cells are constructed and ready for operation. The system is designed to be nondischarging. The third cell will be added if additional capacity is needed to avoid discharge to the Tongue River.[2R]

Although the old lagoon system was operating under an NPDES permit from EPA, the operator reported that it never actually discharged to the Tongue River. As of May 1977, the Mission had already started utilizing the new system. One lift pump is in operation that carries wastewater from the St. Joe and Cheyenne Village areas to the new trunk line. The other lift station to convey wastewater from the northwest area of the Mission is not yet in operation. This effluent is discharging into the old lagoons. These

lagoons are being emptied into the new trunk line and lagoon system. The operator estimated that by fall, 1977, the second lift station would be working and the old lagoons filled in and leveled.

St. Labre Mission provided 55% of the capital outlay for construction of the lagoons with Ashland paying the remainder. The cost sharing was determined on the basis of waste load estimates in single family equivalents for the two sources.

Annual operating and maintenance assessments to the Mission and Ashland for the new lagoon system will be based on the proportion of wastewater flow contributed by each during the previous year. The trunk lines from the Mission and Ashland both are metered. The sewer line from the Mission to the lagoons is an eight inch diameter force main.

For design purposes of the new treatment system, the Mission's contributing population was estimated to be about 1200.[3R] This number includes students, teachers, and other daytime only population on the Mission grounds. The Northern Cheyenne Tribal Census of 1976 found the Mission area resident population and Ashland Indian population to be 256. There were six Indian households in Ashland, which at 4.5 persons per household, amounts to about 27 people. This places the resident Mission population at about 229. Since the new Ashland lagoon system was designed to accommodate some degree of growth anticipated from energy related development, it should provide adequate capacity for the Mission for some time to come.

In March, 1977 the Guild Arts and Crafts plastics factory on the Mission grounds ceased operations. It formerly employed over 60 persons and would have been serviced by the new sewage system.

There have been six homes built through Housing Authority projects immediately west at the Mission grounds. These homes utilize private sewer and water systems. While these homes and future units built in the immediate vacinity could feasibly be hooked up to the Ashland-St. Labre system, several institutional problems exist. First of all, these adjacent areas are not included in the sanitary district. The issue of district extension is within the jurisdiction of the district's Board of Directors. Secondly, there are no long term agreements between the Northern Cheyenne Housing Authority and St. Labre Mission for sharing sanitary services. Each Housing Authority home must be able to be financed and purchased separately by individual homeowners. Finally, there is little available land left close enough to the Mission system upon which additional homes could be built and potentially serviced by that system.

The sewage disposal system for Ashland Cluster on the Northern Cheyenne Indian Reservation near Ashland consists of gravity mains and a new tow-cell lagoon. The total surface area of the two cells is approximately 1.4 acres. This system serves a population of about 80 people in 15 households. The two lagoons are operated in series. The system discharges occasionally to the Tongue River, while losing effluent to subsurface seepage and evaporation

most of the time. The DHES Water Quality Inventory reported that the sewage disposal system appears to be of sufficient size to provide for the needs of this housing development. To ensure secondary treatment the report recommended that possibly another cell be constructed to provide three cells operated in series and a chlorination unit to be installed to disinfect the effluent. Funds for this system were provided by the Public Health Service.

Two new Housing Authority homes built near Ashland Cluster were not connected to this treatment system because they were over 250 feet from the sewer line and would have insufficient flow to keep the extension line flushed and unplugged.

Constraints of steep topography and private land ownership will allow few, if any, more new homes from being constructed in areas serviceable by this system.

ASHLAND-ST. LABRE FACILITIES PLAN SUMMARY[5]

A three cell lagoon system had been designed for the combined sewage flows of Ashland and St. Labre. Pond sizes are:

Pond No. 1 -- 5.76 acres water surface at 5' depth
Pond No. 2 -- 6.92 acres water surface at 5' depth
Pond No. 3 -- 5.62 acres water surface at 5' depth

Pond No. 3 will not be built until actual population growth and use indicate Pond No.'s 1 and 2 will overflow within say, one year of projected growth. Ashland has Coal Board money sufficient to build the third pond but everyone involved feels that this is looking too far into the future because there is no assurance Ashland will ever need the third pond. If they ever need the third pond, it will be because of coal impact and we thus should be eligible for Coal Board grant to build the third cell at that time. Thus, for now, we will give money back to the Coal Board rather than spend it on a third cell at this time.

The lagoon is not designed for percolation. Thus, any percolation which results will project the life of the two existing cells. The existing project was built under a State-approved specification which called for the contractor to install 8" of compacted "impervious" soil lining. When completed, The No. 1 cell should be within the generally accepted leakage rate of $\frac{1}{4}$" per day. Somehow during the winter it seemed to have developed a leak which probably caused a greater percolation rate than $\frac{1}{4}$" per day. This was probably caused by frost getting into the lagoon bottom and causing a crack or cracks in the lining. This is a situation which could have occurred in this first winter because sewage was not pumped from the pond until January and then only at a reduced rate. In future years, the lagoons will have sufficient water depth to protect the bottom of the pond against freezing. At any rate, this was brought to the attention of the Board of Health engineers who expressed no serious concern about this situation. Since early spring the pond definitely has begun again to hold water.

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[5]McCullough, David, 1977. Engineer with Hurlburt, Kersich, & McCullough, Inc., Billings, Montana. Letter dated June 16, 1977.

What could have happened is that bentonite used in making the "impervious" lining may have been carried into the cracks to perform a self-sealing operation. Percolation was not allowed in sizing these lagoon basins, but it could be a factor in making the ponds serve a greater population than 576 for Pond No. 1 or 1,268 for Ponds No. 1 and 2, combined.

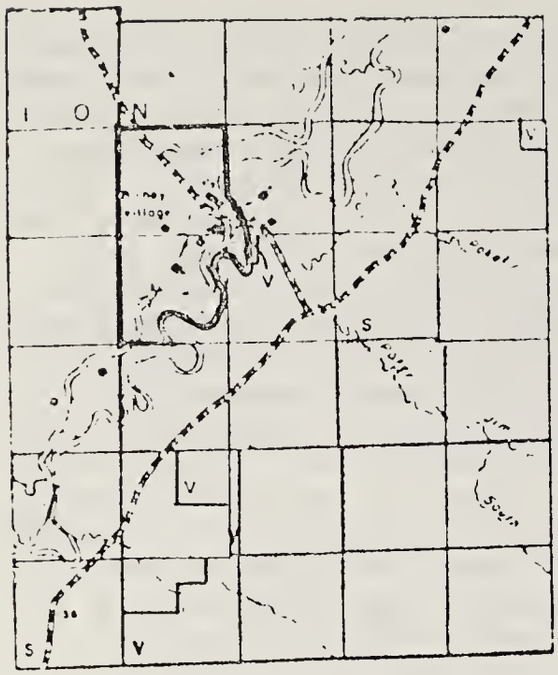
Lagoons can be sized for estimated flow in, based on population, evaporation and percolation. Because of factors beyond the ability of any engineer to predict such things as population growth rate and per capita sewage flow, especially for a brand new system like this, it is not judged practical to use other than the Montana time-tested rule of thumb of 1 acre of water surface for 100 persons for conventional sewage lagoons like this. On this basis, the lagoon system would have a population capacity of 1,268 persons for Ponds 1 and 2 combined or 1,830 persons for all three ponds in the future. This is to prevent overflow and the treatment and/or discharge permit required for an overflow. With more than 20 acres of prime agricultural land--land owned by the Mission west of and immediately adjacent to the lagoon, we see no reason why irrigation with lagoon effluent could not be effectively used for populations as high as 2,500 to 3,000 persons. After that, mechanically aerated facilities could be added to Pond No. 1 or ahead of all ponds to reduce the BOD loading on a conventional 18 acre lagoon system to acceptable limits. The Mission's present leaseholder irrigates the land involved by pumping water out of the river. Lagoon effluent could be put on the land by gravity flow only. If the present leaseholder would not use lagoon effluent to irrigate, the Mission has a three year lease and future arrangements could be made for a change in irrigation policy to fit in with a sewage disposal concept. Experience has been that irrigators are enthusiastic about using lagoon effluent as a substitute or supplement for conventional irrigation water. There should be no reason to judge any other attitude will be involved if Ashland ever grows to make this a necessary sewage disposal consideration.

Ashland Water and Sewer District--We do not anticipate a foreseeable need to obtain a discharge permit. At the Board of Health's suggestion, the District eliminated the need to consider a discharge permit at this time by building the lagoon system without an overflow or drain pipe. Such a pipe system could be added at a future time when and if a lagoon discharge to the river is necessary or desirable. With irrigation for effluent disposal as a very feasible proposal, as discussed in the foregoing, we do not anticipate a future need for a discharge system and therefore a discharge permit.

Our best information is that the Town and Mission combined have a present population of:

Single Family Residences	550
Institutional Users & Day-Only Type	945
TOTAL	1,495

Since sewage flow from day-only type and institutional users would be less than average single family residences, the total population equivalent in single family residences is estimated to be 930 persons. Relating this to the 1,268 person capacity of the present two cell lagoon and 1,830 person capacity of the future three cell lagoon, the engineers believe the design decisions to be prudent, practical, and in the best interests of the District. Ashland is expected to grow to a significant sized town only if coal development occurs near there. Meanwhile, it has only the equivalent of say 250 families to pay for the system we have built.



BIRNEY VILLAGE is a community in the southeastern corner of the reservation, situated along the Tongue River. The village area property has a population of 84 persons. Birney is served by a public water supply system but no public sewer system. All homes are on individual septic systems. Plans are underway to construct a sewage lagoon system to serve Birney residents.

COMMUNITY WASTEWATER PROJECTIONS AND NEEDS

Wastewater treatment needs on the Northern Cheyenne Reservation are dependent on three principal factors: a) existing inadequate facilities; b) population growth on the reservation; and c) future land use patterns. Reservation treatment needs are prioritized by community in the following discussion.

Lame Deer

Plans are underway to construct a new sewage treatment lagoon system for Lame Deer. The existing lagoons are located on land that has been designated for construction of a new high school complex. The unavailability of this land because of the lagoons has already delayed construction funding of the new high school. Therefore, relocation and construction of a new treatment system for Lame Deer is of the highest priority even without water quality considerations.

The present Lame Deer lagoon system appears to be consistently meeting suspended solids effluent limits and usually meeting effluent BOD limits of 30 mg/l and 85% reduction. The effluent is not consistently under the 200 fecal coliform/100 ml monthly average however, particularly in the winter months. The groundwater seepage into the lagoons make it impossible to store the entire winter volume which amounts to about 160 acre feet. The present lagoons may store up to 100 acre feet. Effluent must be discharged year-round resulting in high fecal coliform loads in winter months.

Plans and specifications for a new two-cell aerated lagoon system have been prepared by a contractor to the Indian Health Service. Construction funds for the work however, are at least one year away in forthcoming.[4R] The new lagoons would be constructed approximately 2.5 miles north of Lame

Deer and discharge to Lame Deer Creek one-half mile above its confluence with Rosebud Creek. This location means that sewer main will be lain through almost two miles of farm land north of Lame Deer. The site was one of the only parcels of tribal land available, the remainder of the intervening land being in private ownership and unavailable. While the capital cost and potential land use conflicts are certainly adverse factors and raise serious questions, the constraints of land ownership and topography may leave little choice.

The new facility is planned to handle a flow of 133,000 gpd and a BOD load of 437 lbs per day. This compares to a present flow of about 72,000 gpd and a BOD load of 100 to 180 lbs per day. Thus the facility could handle almost twice the present flow and waste load.

The vendor for the aeration system claims his systems will meet all EPA standards, including 95% BOD removal, 30-45 mg/l suspended solids and 200 fecal coliform/100 ml. Given that the present Lame Deer system cannot always meet the 200 fecal coliform/100 ml standard, consideration should be given to chlorinating the effluent, especially since the system is designed to discharge continuously. Funding for this equipment would have to come from the Indian Health Service, and its possibility is unknown at present.

Throughout the summer and fall of 1976, a land disposal system for Lame Deer wastewater was considered as an alternative. Several Indian Health Service, Bureau of Indian Affairs and tribal organizations participated in the discussions. The basic plan was to store sewage effluent in a reservoir and use it to irrigate cropland in the Lame Deer valley north of town. NCRP 208 staff assisted in the calculation of water availability for irrigation and the acreage needed. A water sample of the sewage influent was analyzed

for chemical suitability. Short reports on both topics were prepared for tribal and agency use.

The land application alternative does not appear feasible at this time due to lack of available land for wastewater application. All but one parcel of farm land down the valley from Lame Deer is in private ownership. It was felt that no appropriate long term lease of private land could be arranged. The 36 acre parcel in tribal ownership is about 2.5 miles north of Lame Deer and already has at least two 2½ acre homesites planned for it. In addition, it was not large enough to allow for the irrigation system contemplated.

There is some uncertainty over the current per capita rate of water usage in Lame Deer. Water meter records indicate average flow delivered to the community is about 100,000 gpd. The Northern Cheyenne Utilities Commission bills 500 households for water service. At an average of 4.5-5 people per household (i.e., 2000 to 2500 population), this is 40 to 50 GPCD. The most recent census conducted in Lame Deer[5R] gave a population of 1357 persons in 380 households. A number of these households, perhaps as much as 10%, are not serviced by public sewer. These figures would imply a water use rate of 75 to 85 GPCD. Since the recent census was judged to be relatively accurate, it would seem wise to use a planning figure in the higher range. The other main assumption is that 70% of the water used by the community gets back into the sewer system. If this percentage is higher than the population that can be served by a certain design, flow is diminished proportionately.

Population projection figures presented in Figure __ indicate that under normal growth rates, Lame Deer could be expected to increase from 1350 to 2000 people by the year 1996. The new facility appears capable of handling

a population of 2500 at the current water use rate of 75 gallons per person per day. This population level could be reached sometime beyond the year 2000. These population projections assume a continuation of present vital rates of birth, survival and death. They also assume that non-Indians will comprise the same percentage of the total population as in 1976. The projections, in effect, do not consider any large influx of energy-related growth on the reservation. Given the uncertainties over the magnitude of energy related growth in the region and on the reservation, it appears unwarranted to plan for facilities much larger than the one designed. The lagoon system should be designed so as to allow installation of additional lagoon cells as a buffer against unexpected population increases or higher water use rates.

Future land use development is a third important factor affecting wastewater treatment needs. Lame Deer experienced a four to five-fold increase in population from 1960 to 1970 along with much new home construction. Construction on approximately 10 single and multi-family dwellings on the south side of Lame Deer is currently in progress. The projected population increase from 1976 to 1996 in Lame Deer, would demand an additional 145 new dwelling units. Much of the current new home construction demand is filled by families wanting to upgrade their housing situation or move to a more desirable location.

A new BIA Realty contract will soon be let to locate and survey and plat approximately 100 new homesites in Lame Deer that would be serviced by public sewer. These subdivisions will likely be located mainly on the west and wouthwest sides of town. Sewer extensions have already been made to service other recent developments in those two directions.

Quite a list of other new facilities are under way or planned for

construction in Lame Deer:

FACILITY	LOCATION	STATUS
New PHS Clinic	Northeast side	80% completed
New Elderly Home	Northeast side	Groundwork underway
Tribal Building Expansion	At Existing site	Completed
I.A.P. Building Expansion	Northeast side	Groundwork underway
New High School	Northeast side	Two years away
Community College	Northeast side	Groundwork underway
New Juvenile Center	West side	Two years away

Of this list, it is likely that only the new high school and community college may make significant waste load contributions in addition to the basic population projections. The other facilities primarily involve expansion or replacement of old structures.

In is questionable that the same rapid rate of population growth that occurred in the 1960's can continue. Two principal factors are already constraining growth within Lame Deer. There is a strong trend to rural locations in new home construction. People are preferring to get out in the countryside, even though they may work in Lame Deer. Since 1967, 318 new homes have been constructed in reservation communities, 199 of those in Lame Deer, while 233 have been constructed in rural areas. Most of the 66 homesites in the latest Housing Authority project are planned for rural areas.

The major constraint is one of land availability due to topography limitations and private ownership. Lame Deer is located in an alluvial valley, one quarter to one-half mile wide and bounded by steep hills on both east and west sides. Townsite expansion to the north, northeast, and south is constrained by farmland in private ownership. Sites for most new homes and public facilities are located primarily on tribally owned land since it can be acquired through lease at little or no cost. Little money exists for

purchase of private land by either the tribal government, public agencies or private individuals on the reservation. There is a tribal land acquisition program that purchases land in the name of the tribe. Several lots have been purchased within Lame Deer. While purchase of land immediately adjacent to Lame Deer for expansion would be desirable, it appears that tribal or public funds will not be available in the near future.

Several public sewer and water line extensions are being planned by Indian Health Service in Lame Deer. The first one is a 1200 foot extension to service the Spotted Elk Heights area. Work is to commence in summer 1977. This extension would service an area already platted for homesites and fill a service gap between an area further up the valley that is already serviced. The Spotted Elk Heights area does have several older and one new home, but is largely undeveloped. Approximately 65 lots are platted, however, a number of these are already occupied or have access blocked.

Another sewer and water extension planned for summer, 1977 is from the elderly housing complex, 600 feet, to the northeast lagoon. Some opportunity for future hookups exists on a five acre parcel of tribal land just north of the elderly complex.

The IHS engineer in Lame Deer indicated that another application for funds for 3000 feet of sewer and water line extension has been made to IHS. The locations for line extensions under this project will be determined in part, by the results of the surveying and mapping contract being administered by the NCRP and surveyed and staked by a contractor with the 3,000 foot line extensions as part of the criteria. Priority areas at this point include a small parcel of tribal land just north of the elderly complex, a northeast extension of the Crazy Head Heights area, a westward extension of the Beverly Hills area, and parcels of tribal land southwest of Lame Deer.

A map of Lame Deer including possible housing areas and sewer line extensions is shown in Figure __.

BIRNEY VILLAGE

After the new Lame Deer facility, the Northern Cheyenne Tribal Council and Utilities Commission have placed a priority on installation of a sewage lagoon system at Birney. All 22 occupied homes are currently on individual disposal systems and there have been problems with the operation of some of these.

Indian Health Service funds for this new system could become available as early as summer 1977, with construction to start in latter 1977 or in 1978.[6R] The lagoon system would be designed primarily to serve the ten Housing Authority project homes and others near the trunk line to the proposed lagoon site. Although the lagoon site and design is still being formulated by IHS engineers, it appears possible that the system would be non-discharging. As is the case with the Muddy Creek Cluster and Ashland Cluster lagoons, the relatively low rate of influent flow and high evapotranspiration and seepage rates could combine to eliminate any surface discharge to the Tongue River.

Birney has generally lost population in recent years due to people moving into other reservation communities. Based on their 1976 census and numerous personal interviews, the NCRP sociology staff feels that Birney will probably remain near its current population level of 84 for several years to come. Population projections indicate that under normal growth rates, Birney could reach about 130 people by 1996.

Land use developments hold the greatest potential for affecting Birney's future. The MONTCO coal and power consortium backed by Pacific

Northwest utility firms plan to open a coal strip mining operation directly across the Tongue River from Birney. Coal exploration firms are currently conducting geologic and environmental studies on the site. A tentative mine start up time has been forecasted for 1981. Should this come about, the increased employment opportunities or service related business opportunities could attract many more people, both Indian and non-Indian, to Birney. The potential impacts of this neighboring development indicate that the proposed Birney sewage treatment facility be designed with flexibility and ease of expansion in mind.

BUSBY

The Busby sewage lagoon system deserves consideration for upgrading because it occasionally discharges substandard effluent to Rosebud Creek and is currently servicing more than the 300 persons it was designed for.

Population projection trends presented in Figure__ indicate that under normal growth rates, Busby could grow from 468 currently to about 770 by 1996. These projections are accurate forecasts of growth under current vital rates and a similar proportion of non-Indian residents. However, they do not account for high rates of immigration that could be associated with energy related development in the area. When and where this development could occur is only speculative at this time.

Land use trends evidence Busby as continuing to be a growing community. In the last ten years, approximately 80-90 new housing units have been built in Busby. A number of those, of course, are replacement units. Housing Authority projects have accounted for about 30 of these units. Population projection figures indicate that Busby could expect an additional 70 housing units by 1996.

An additional impetus to further development in Busby could be the resurveying and platting of the townsite that is to be done during summer, 1977, under a BIA contract to the tribe. Lots and blocks will be surveyed and staked and subdivision plats drawn. This work should considerably enhance the availability of homesites in Busby. Unlike Lame Deer, Busby, is surrounded by tribal land with building potential.

To better treat existing loads and handle anticipated growth, Busby should be considered for a new or expanded 3-cell facultative lagoon system. Since land appears to be available, the lagoons could be designed so as to be nondischarging to surface waters. This could prevent the fecal coliform pollution of streams associated with year-round lagoon discharges. Funding for an expanded or new treatment system would come from the Indian Health Service. At present, such funds are not available, nor has any application from the tribe been made as yet. An additional option is to study the feasibility of sprinkler irrigation of the effluent on nearby cropland.

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DRAFT

Regulatory Programs

The Northern Cheyenne Utilities Commission (NCUC) is the principal organization charged with administering wastewater treatment facilities on the reservation. The NCUC was organized under the authority of the Northern Cheyenne Tribal Council. They determine hookup policies, collect fees for service and maintain the facilities.

The NCUC relies on the Indian Health Service for engineering, design and water testing services. The IHS engineer in Lame Deer is responsible for much of the day-to-day troubleshooting and management of the water and sewer systems. He draws up facilities plans and helps determine treatment priorities. While everyday treatment needs were being handled, there was often poor communication among the various agencies involved in land use or housing decisions on the reservation.

Since the NCRP 208 and land use staff commenced work on land use mapping, several meetings were held that brought together most of the principal organizations involved in housing, roads, sanitation, livestock, realty, etc. From one of these meetings, the NCRP was requested to prepare and submit a resolution to the Tribal Council requesting formation of an advisory Tribal Land Use Planning Committee composed of representatives from each of these groups. The resolution passed on _____,1977. The Land Use Committee is advisory to the Tribal Lands Committee which has jurisdiction over most land-related problems on the reservation.

The first general meeting was held at which time planning needs and functional duties were discussed. The committee will advise the Tribal Lands Committee on matters of homesite locations, expansion of communities, land use conflicts and planning needs. The NCRP is the technical support group for the committee. The committee will analyze and use the various maps and overlays being produced by the NCRP 208 and land use projects. The committee will provide a means for reservation-wide planning of resource use, housing location and wastewater treatment.

It may well be that the existing regulatory powers of the agencies involved are sufficient to provide for adequate planning and prevention of wastewater pollution problems. The recently formed land use planning committee may provide the communication necessary to facilitate timely and adequate assessment and control of problems. If additional regulatory authority is found to be needed, the planning committee may work with the Tribal Lands Committee in developing the best approach to the problem. Proposed regulations could be submitted by the Lands Committee to the Tribal Council where final approval action would be required to authorize any new regulations, statute or code.

Regulations or guidelines adopted in this way could be implemented directly by any tribal organization or be submitted to other government agencies such as the BIA or IHS for implementation.

Increasingly, however, Indian tribes are taking on more of the administrative responsibilities associated with water resources or land use management. The Constitution of the Northern Cheyenne Tribe allows it to adopt plans, regulations and programs that protect and manage its natural resources and general welfare. These could include land and water management plans and codes.

Social and Environmental Impacts

This part of the 208 plan for the Northern Cheyenne Reservation makes no structural recommendations for facilities that will not eventually be done by the Indian Health Service and Utilities Commission as time and money permit. The recommendations previously mentioned are ones of increased institutional communication and the development and use of better technical information for land and water management.

The environmental impacts of this plan are not structural or disruptive. Nothing new will be built nor be kept from construction. The plan stresses sound land and water planning so its largest impact may be in guiding the location and timing of houses, facilities, etc., which would be built anyway.

The social impact will be determined by how effectively the organizations involved, Tribal Council, Land Use Planning Committee, NCRP and others, inform and involve the residents of the reservation. Changes in housing policies, zoning, water use,etc. must stem from the Tribal Council and its committees and be given the necessary time and public exposure for review and modification.

INDUSTRIAL PRETREATMENT REGULATIONS

In response to Section 208 (b) (2) (c) the following regulatory program shall be initiated.

(1) Each incorporated community shall be responsible for the management of its waste treatment facilities. Unincorporated community waste treatment management shall be the responsibility of the county within whose boundaries that community exists.

(2) The responsible parties named in (1) shall comply with the state regulations in locating, modifying, or constructing any facilities, within their respective jurisdiction, which may result in any discharge to state waters.

(3) The responsible parties named in (1) shall institute regulations assuring that any industrial or commercial wastes, discharged into any treatment works within their respective jurisdiction, meet at a minimum, the following pretreatment requirements:

a) Hospitals shall store radioactive wastes for a period of at least ten half-lives before discharge. These discharges and bacteriocide discharges shall be regulated to avoid surges disruptive to the treatment process. The pH of the discharge shall be maintained between six and nine standard units.

b) Commercial and industrial pretreatment shall consist of eliminating from its respective waste stream, any oil or grease in excess of 10 mg/l, any solids that may prove harmful or disruptive to the collection or treatment system, and any other harmful constituents, in excess of applicable water quality standards that are not normally treated by municipal wastewater treatment system including, but not limited to, phenols, PCB's, pesticides, bacteriocides, disinfectants, heavy metals, color, radioactive materials. The pH of the discharge shall be maintained between six and nine standard units.

c) A record supplied by the discharger to the receiving treatment system manager identifying the composition and flow rate of the discharge stream in sufficient detail to provide adequate loading information and treatment cost accounting.